

1 VISITOR SAFE WIRELESS PRINTER ACCESS POINT

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7 TECHNICAL FIELD8 Embodiments of the present invention relate generally
9 to network printing technology, and more particularly to a
10 visitor safe wireless printer access point.
1112 BACKGROUND13 The issue of permitting easy access to network
14 printers for wireless device users, while maintaining
15 internal network security, is a difficult one to solve.
16 Additionally, many network administrators may not even be
17 aware that the technology exists for creating a public
18 print environment within a secure network.19 Currently, a network administrator would have to
20 perform the following steps to set up a public network
21 printing environment for users of wireless devices: (1)
22 setup a wireless access point for public access; (2) setup
23 a firewall between the access point and the secure network,
24 in order to limit the access of the wireless device users
25 to just the printers and/or print servers; and (3) setup a

1 print server on the public network to serve up the
2 appropriate software/drivers for the available printers.

3 Currently, the wireless device users would have to
4 perform the following steps to print: (1) determine how the
5 wireless user can connect to the wireless network (this
6 step usually involves obtaining the appropriate encryption
7 key and network identification (ID), as well as giving the
8 wireless device user access to more devices in addition to
9 just the printers); (2) switch their current wireless
10 devices to use the wireless network; (3) browse the
11 wireless network to find the available printers, by using
12 the wireless device's current add printer technology; (4)
13 add the available printer; and (5) perform printing by use
14 of the added printer.

15 It is difficult to create a public network printing
16 environment for the wireless device users, in a secure
17 network. Additionally, there is the complex process of
18 setting up a device for printing in a new network.
19 Furthermore, there are major security issues when allowing
20 the wireless device users to print in a secure environment.
21 It is important that the wireless device users are not able
22 to access particular devices in which the users have no
23 authorization to access.

1 Therefore, the current technology is limited in its
2 capabilities and suffers from at least the above
3 constraints or deficiencies.

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1 SUMMARY OF EMBODIMENTS OF THE INVENTION

2 In one embodiment of the invention, a method for
3 providing a visitor safe wireless printer access point,
4 includes: connecting a wireless computing device to a
5 wireless network; checking a packet from the wireless
6 computing device in order to determine if the wireless
7 computing device is attempting to connect to an available
8 printer in a secure wired network; downloading a printer
9 driver and printer driver information to the wireless
10 computing device, and initializing the printer driver;
11 using the wireless computing device to print via the
12 available printer in the secure wired network; and
13 transmitting the print job, split into network packets, to
14 a spooling device, if the packets are allowed packets.

15 The packets are checked by a printer access point
16 device (wireless access point). The wireless security
17 settings are checked to determine if the packets are
18 permitted to be transmitted to the spooling device.

19 In another embodiment, apparatus for providing a
20 visitor safe wireless printer access point, includes: a
21 wireless computing device configured to connect to a
22 wireless network with a printer access point device; a
23 spooling device configured to download a printer driver and
24 a printer driver information to the wireless computing

1 device; and wherein the spooling device is configured to
2 check a packet from the wireless computing device in order
3 to determine if the wireless computing device is attempting
4 to connect to an available printer in a secure wired
5 network, and to transmit the packet to the spooling device
6 if the packet is an allowed packet, so that the wireless
7 computing device can be used to print via the available
8 printer in the secure wired network.

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10 These and other features of an embodiment of the
11 present invention will be readily apparent to persons of
12 ordinary skill in the art upon reading the entirety of this
13 disclosure, which includes the accompanying drawings and
14 claims.

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1 BRIEF DESCRIPTION OF THE DRAWINGS

2 Non-limiting and non-exhaustive embodiments of the
3 present invention are described with reference to the
4 following figures, wherein like reference numerals refer to
5 like parts throughout the various views unless otherwise
6 specified.

7

8 Figure 1 is a block diagram of an apparatus (system)
9 in accordance with an embodiment of the invention.

10 Figure 2 is a flowchart of a method for a visitor safe
11 wireless printer access point, in accordance with an
12 embodiment of the invention.

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1 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

2 In the description herein, numerous specific details
3 are provided, such as examples of components and/or
4 methods, to provide a thorough understanding of embodiments
5 of the invention. One skilled in the relevant art will
6 recognize, however, that an embodiment of the invention can
7 be practiced without one or more of the specific details,
8 or with other apparatus, systems, methods, components,
9 materials, parts, and/or the like. In other instances,
10 well-known structures, materials, or operations are not
11 shown or described in detail to avoid obscuring aspects of
12 embodiments the invention.

13

14 An embodiment of the invention simplifies and
15 condenses the necessary tasks to create a secure, public
16 network printing environment for wireless device users
17 (i.e., mobile users). Embodiments of the invention
18 advantageously allow access to the current installed base
19 of printers on a network, without allowing the mobile user
20 to access the entire network. By use of print spooler
21 technology (network printer technology), wireless access
22 point technology, and firewall technology in a novel and
23 unique manner, an embodiment of the invention provides a
24 wireless printer access point device that permits a mobile

1 user(s) to connect to a wireless network and print to a
2 particular printer(s) in a secure wired network, while not
3 permitting the mobile user to access other devices in the
4 secure wired network. The mobile user can easily connect
5 to the wireless network and is directed to the print
6 spooling device. The print spooling device will then serve
7 the printers that can be used for printing by the mobile
8 user.

9 Additionally, embodiments of the invention permit the
10 wireless device user to print from printers in the secure
11 wired network, while advantageously not requiring any
12 changes to the secure wired network.

13 An embodiment of the invention packages many of the
14 necessary hardware elements for a visitor safe wireless
15 printer access point into one device, and configures the
16 device to make the creation of a public network printing
17 environment for mobile users in a much easier manner. An
18 embodiment of the invention also addresses the major
19 security issues when allowing the mobile users to print in
20 a secure environment and provides a service that eliminates
21 the complex process of setting up a device for printing in
22 a new network.

23

1 Figure 1 is a block diagram of a network system
2 (apparatus) 100 that can implement an embodiment of the
3 invention. In the example network system 100, a mobile
4 user 105 can use a wireless device 110 to access a wireless
5 network 115 and print from one or more printers 120 that
6 are included in a secure wire network 125. As an example,
7 the secure wire network 125 is based upon the Ethernet
8 specification. In the example of Figure 1, the printers
9 are generally referred to as printer(s) 120. The printer
10 120a and printer 120b are examples of particular printers
11 that are included in the secure wire network 125. The
12 number of printers 120 in the secure wired network 125 may
13 vary. The mobile user 105 is typically not authorized to
14 use other devices (such as secure device 135) in the
15 secured wired network 125.

16 The wireless device 110 is a suitable computing device
17 such as, for example, a laptop, notebook computer, palmtop,
18 or other type of suitable portable computer with wireless
19 operation capability. One suitable wireless protocol for
20 the wireless device 110 is, for example, the IEEE 802.11b
21 standard.

22 A printer 120 may be a printing device for generating
23 a printed output 130 from a print job. Alternatively, a
24 printer 120 may be other types of devices, such as a copy

1 machine, fax machine, or digital projector that can
2 generate a printed output 130 from a print job.

3 The secured wired network 125 may also support other
4 devices that have restriction on access. For example, the
5 secured wired network 125 supports a secure computer 135
6 (and/or other secure device) that is not accessible by the
7 mobile user 105 without authorization.

8 Various known components and modules that permit the
9 printer 120 or/and other devices to interface in the secure
10 wired network 125 are not shown in Figure 1 for purposes of
11 describing a functionality of embodiments of the invention.
12 Additionally, various known components and modules that
13 permit the wireless computing device 110 to interface with
14 the wireless network 115 are not shown in Figure 1 for
15 purposes of describing a functionality of embodiments of
16 the invention.

17

18 Assume that the mobile user 105 intends to access one
19 or more of the printers 120 in the secure wired network
20 125, in order to perform a print operation. The mobile
21 user 105 will first permit the connection of the wireless
22 device 110 to the wireless network 115 by use of a suitable
23 protocol such as the IEEE 802.11b standard. It is
24 understood that the wireless device 110 includes standard

1 hardware and software for permitting communication via the
2 wireless network 115. Typically, the mobile user 105 will
3 configure the wireless settings of the wireless device 110
4 to match the visitor settings of the wireless network 115,
5 in order to access the wireless network 115.

6 The PRINT network may be broadly defined as including
7 the spooler device 187 and printer access point device 145.
8 The PRINT network is a public wireless network 115 in the
9 example of Figure 1. The wireless computing device 110 can
10 connect to the public wireless network 115. The public
11 wireless network 115 may be, for example, a public 802.11b
12 network. As one example, PRINT is the SSID setting that is
13 necessary to communicate on the public 802.11b wireless
14 network where encryption is not enabled. However, it is
15 within the scope of embodiments of the invention that other
16 settings (e.g., the string "MYPRINTERS" or other settings)
17 may be used to communicate on a public 802.11b wireless
18 network. Additionally, it is within the scope of
19 embodiments of the invention that the public wireless
20 network 115 may be implemented by use of other suitable
21 types of networking technologies and that the public
22 wireless network 115 is not limited to the IEEE 802.11b
23 standard. Therefore, other settings are typically used to

1 connect to these public wireless networks 115 that
2 implement other networking technologies.

3 By connecting to the PRINT wireless network, a user
4 105 can locate available printers 120, automatically create
5 a way to print to an available printer 120, and then print
6 a job 131 to the printer 120. The actual printer 120 may
7 reside only on the secure wired network 125, and the
8 spooling device 187 may accept a print job 131, spool the
9 job 131, and then print the job 131 to the printer 120 on
10 the wired network 125.

11 The print job 131 is transmitted from the wireless
12 device 110 to the printer access point device (wireless
13 access point) 145. The print job 130 is split into network
14 packets 131a and transmitted to the print spooling device
15 187, if the packets 131a are allowed packets. The packets
16 131a are checked by the printer access point device
17 (wireless access point) 145, prior to the transmission of
18 allowed packets 131a to the print spooling device 187. The
19 standards based wireless security settings 192 are checked
20 by a processor 149 to determine if the packets 131a are
21 permitted to be transmitted to the spooling device 187.
22 Therefore, the wireless access point 145 provides a public
23 access point that allows access to the wireless network 115

1 where only the print spooling device 187 would be
2 available.

3

4 The print spooling device 187 has a wireless
5 connection 116 to the wireless network 115 and a wired
6 connection 126 to the secure wired network 125. The print
7 spooling device 187 is a gateway to the secure wired
8 network 125.

9 The print spooling device 187 also includes a firewall
10 module 165 that performs all firewall activities, as
11 described in additional detail below, so that allowed print
12 job packets 131a are sent to the appropriate printer 120 on
13 the secure wired network 125.

14 The spooling device 187 also includes a printing
15 subsystem 166 that performs the printer setup, print job
16 spooling, downloads of printer drivers 167, and other
17 functions to permit printing operations. The printing
18 subsystem 166 may be, for example, a WINDOWS® print
19 subsystem, a LINUX print subsystem, or other types of
20 printing subsystems.

21 The public print shares 168 establish a print path
22 through the spooling device 187 to the secure wired network
23 printer 120.

1 The processor 146 in the print spooling device 187
2 processes the network packets 131a for transmission to a
3 destination printer 120. The processor 146 can also
4 execute the software programs in the print spooling device
5 187.

6
7 The printer access point device 145 is configured to
8 allow wireless access to only the spooler device 187, which
9 may be contained within the access point, within a given
10 secure network environment 125. To accomplish this
11 functionality, the printer access point device 145 is
12 typically set up to allow public access without encryption
13 to the PRINT network. The printer access point device 145
14 allows access to only the spooler device 187 which by
15 omission it prevents the mobile user 105 to access other
16 devices (e.g., secure computer 135) in the secure wired
17 network 125.

18 The printer access point device 145 implements current
19 wireless access point technology that permits the mobile
20 user 105 to access the PRINT network. In an embodiment,
21 the printer access point device 145 may include a standard
22 access point module (in hardware or/and software) that acts
23 as a communication hub for mobile users 105 of wireless
24 devices 110 to connect to the PRINT wireless network that

1 will allow indirect access to the printers 120 in the
2 secure wired network 125.

3 Upon connection of the wireless device 110 to the
4 PRINT network, a browser software 150 in the wireless
5 device 110 is directed to a print web page that is served
6 by the web server 169. The browser software 150 is
7 typically an HTML (hypertext markup language) browser. The
8 processor 151 in the wireless device 110 can execute the
9 browser 150 and execute other software or firmware in the
10 wireless device 110. The web server 169 in the spooler
11 device 187 may typically serve the print web page to the
12 browser 150. The mobile user 105 is then presented with
13 the print web page on a screen of the wireless device 110,
14 where the print web page lists or shows all available
15 printers 120 in the PRINT network. The mobile user 105
16 could then select one of the available printers 120 in the
17 print web page for printing.

18 As mentioned above, the printer access point device
19 145 allows access to the print spooler device 187. The
20 print spooler device 187 also includes the standard
21 firewall 165 that will disallow direct access by the
22 wireless device 110 to any part of the secure wired network
23 125. The print spooler device 187, which includes the
24 firewall 165, would capture all packets sent from the

1 wireless device 110 via the wireless network 115, and then
2 the print spooler device 187 will spool and send the
3 allowed print job packets 131a to the appropriate printer
4 120 on the secure wired network 125. The firewall 165 is
5 typically a code or a set of related programs that protect
6 the resources of the secure wired network 125 from
7 unauthorized users. As known to those skilled in the art,
8 a firewall examines each network packet to determine
9 whether to forward the packet toward its destination.

10 When the wireless device 110 connects with the printer
11 access point device 145, the wireless device 110 will
12 transmit packets (from a print job 131) that are received
13 by the printer access point device 145. The wireless
14 access point device will relay the packets to the spooler
15 device 187, which contains the firewall 165. The firewall
16 165 will examine the destination address (DA) of the
17 packets to determine if the wireless device 110 is
18 attempting to connect to a printer 120 that is permitted to
19 be accessed by the mobile user 105, or if the wireless
20 device 110 is attempting to connect to a restricted
21 resource (e.g., secure device 135 in secure network 125)
22 that is not permitted to be accessed by the mobile user
23 105. If the firewall 165 determines that the destination
24 address of the packets is to one of the printers 120a or

1 120b (or to other available printers 120, then the firewall
2 165 will allow the spooling device 187 to spool the packets
3 as part of the print job being sent by the wireless device
4 110. Once the spooling device 187 receives all print job
5 packets for a single print job 131, it will send the print
6 job to the appropriate printer 120.

7 On the other hand, if the firewall 165 determines that
8 the destination address of the packets is to a restricted
9 resource in the secure wired network 125 (such as secure
10 device 135), then the firewall 165 will prevent the packets
11 from transmitting to the destination address, and may be
12 optionally configured to return to the wireless device 110
13 a message indicating, for example, that the requested
14 access to the resource in the destination address has been
15 denied.

16

17 In another embodiment, a mobile user 105 can connect
18 directly to a printer access point device 145 that uses a
19 wireless security module 192. The wireless security module
20 192 is responsible for all standards based wireless
21 security settings. Once the user has connected to the
22 wireless PRINT network through the access point device 145
23 and has been authenticated and/or encryption methodology
24 has been negotiated, the mobile user 105 can be directed to

1 the print spooling device 187, by launching a browser 150
2 or other suitable software in the mobile wireless device
3 110. The available printers 120 are then shown in the
4 screen of the wireless device 110, after connection to the
5 print spooling device 187.

6
7 After the mobile user 105 initially selects one of the
8 available printers 120, the printer driver information and
9 the printer driver 167 for the initially selected available
10 printer 120 will be downloaded to the wireless device 110
11 via the wireless network 115, and a print path is then
12 created from the mobile wireless device 110 to a spooling
13 device 187, and indirectly to the selected wired printer
14 120. This step is applicable to all embodiments of the
15 invention.

16
17 The printer driver information of the downloaded
18 printer driver 167 is needed in order to install the
19 downloaded printer driver 167 locally to the wireless
20 device 110. The printer driver information typically
21 includes multiple files that are required for use of the
22 printer driver 167, including a file with the main entry
23 point that is supported by the printer driver 167, the name
24 of the printer driver, the version of the operating system

1 for use with the printer driver, and other specific
2 information about the printer driver 167.

3 Typically, the spooling device 187 is a server with a
4 standard spooler/scheduler that receives print jobs from
5 other computers and generates printer files that are
6 transmitted to one of the printing devices 120 that can
7 appropriately handle the print job. Therefore, the
8 spooler/scheduler provides the printing capability by the
9 mobile device 110 to the available printers 120. The
10 processor 146 in the spooling device 187 can execute the
11 standard spooler/scheduler and other software or firmware
12 in the spooler device 187.

13 The spooling device 187 also typically downloads the
14 printer driver information and the printer driver 167 to
15 the wireless device 110. The wireless device 110 then
16 creates a printer object 190 after the downloaded driver
17 167 has been initialized, and the selected printer 120 will
18 then be available for printing. The local printer object
19 190 uses (and represents) the physical printer device 120.
20 The local printer object 190 is data with various settings
21 that describe the physical printer device 120. In other
22 words, the data associated with the initialization of the
23 printer driver 167 is stored into the local printer object
24 190.

1 Various known print installation methods (e.g., point
2 and print) may be supported by the spooling device 187 for
3 vending out the drivers 167, after the mobile user 105 has
4 selected an available printer 120 for printing.

5
6 Various examples are available on how a mobile user
7 105 can select an available printer 120 for printing. For
8 example, the mobile user 105 can select an available
9 printer 120 based upon any description that is provided in
10 the print web page for the available printers 120. As
11 another example, the mobile user 105 can select a
12 convenient printer 120 (e.g., a printer that is physically
13 in the proximity of the mobile user 105). The mobile user
14 105 will select a printer name in the list of available
15 printers 120, as indicated in the print page.

16
17 As another example, assume that a mobile user 105 has
18 connected to the wireless network 115 and has loaded a
19 device discovery software that is attempting to discover
20 available printers 120 in the secure wired network 125. In
21 this embodiment, the utility application 150 in the
22 wireless device 110 is a network printer application 150
23 instead of a browser 150, where the network printer
24 application 150 will discover printer devices. Of course,

1 the wireless device 110 could include both a browser and a
2 network printer application for discovering the printer
3 devices. A suitable device discovery software 150 is
4 available from, for example, HEWLETT-PACKARD COMPANY.
5 Device discovery can be performed by sending out a
6 broadcast request or multicast request on a network. The
7 print spooler device 187 can reply back with a list of
8 printers 120 that are available to the mobile user 105.
9 The device discovery software 150 can also set up print
10 paths to the available printers 120.

11

12 It should be appreciated that, in alternative
13 embodiments, the network system 100 may include components
14 and products other than those discussed above. Moreover,
15 the network system 100 can be implemented on different
16 hardware. Printers having printing capabilities different
17 from the disclosed physical printer devices may be used.
18 Those skilled in the art will recognize that other
19 alternative hardware and software environments may be used
20 without departing from the scope of embodiments of the
21 invention. As such, the exemplary environment in Figure 1
22 is not intended to limit embodiments of the invention.

23

1 Figure 2 is a flowchart of a method 200 for a visitor
2 safe wireless printer access point, in accordance with an
3 embodiment of the invention. A mobile user 105 will first
4 connect (205) a wireless computing device 110 to a wireless
5 network (e.g., wireless PRINT network) 115, in order to
6 access and print to a printer 120. The PRINT network 115
7 uses PRINT as the SSID (service set identifier) setting and
8 may or may not use encryption. PRINT is an example of
9 publicly available settings that are necessary for
10 communication on the wireless PRINT network. The PRINT
11 network is intended as a public access point to print
12 spooling device(s). As mentioned above, it is within the
13 scope of embodiments of the invention that the public
14 wireless network 115 may be implemented by use of other
15 suitable types of networking technologies and is not
16 limited to the wireless PRINT network.

17 In step (210), the mobile user will start a type of
18 utility application 150, such as a browser or a network
19 printer application that will discover print devices 120.
20 The browser would be redirected to the spooling device 187
21 and the network printer application would discover the
22 available printers through the spooling device. The
23 spooling device acts as a firewall or bridge that connects

1 the wireless network 115 to the secure wired network 125 to
2 send print jobs to printers.

3 In step (215), the mobile user selects the printer
4 that he/she wishes to print to and the spooling device or
5 network printer application software establishes a print
6 path through the spooling device to the secure wired
7 network printer 120. This is generally done by using
8 printer sharing technology that is available on spooling
9 devices such as, for example, a print spooling appliance
10 available from HEWLETT-PACKARD COMPANY or other suitable
11 spooling devices.

12 In step (220), the mobile user prints to the newly
13 established printer.

14 In step (225), the print job is sent via the wireless
15 PRINT network to the spooling device.

16 In step (230), the print job is spooled on the
17 spooling device and then sent to the printer via the secure
18 wired network 125.

19 In step (235), as an option, the print job status is
20 relayed from the printer, via the secure wired network, to
21 the spooling device and then from the spooling device, via
22 the wireless PRINT network, to the wireless device.

23

1 Thus, an embodiment of the invention simplifies the
2 task of permitting a printer (or printers) to be publicly
3 available to users of wireless devices, in a secure network
4 environment. An embodiment of the invention, when
5 connected to a wired or wireless network, would give the
6 mobile users the ability to connect to a network and easily
7 perform printing, while disallowing access by the mobile
8 users to the secure resources of the network. In addition,
9 an embodiment of the invention provides a service to the
10 mobile users that presents them a list of the available
11 printers upon connection to the wireless network, and then
12 configures the mobile wireless device to print to the
13 available printer that is selected by the mobile wireless
14 device user.

15

16 The various engines, tools, or modules discussed
17 herein may be, for example, software, firmware, commands,
18 data files, programs, code, instructions, or the like, and
19 may also include suitable mechanisms.

20

21 Reference throughout this specification to "one
22 embodiment", "an embodiment", or "a specific embodiment"
23 means that a particular feature, structure, or
24 characteristic described in connection with the embodiment

1 is included in at least one embodiment of the present
2 invention. Thus, the appearances of the phrases "in one
3 embodiment", "in an embodiment", or "in a specific
4 embodiment" in various places throughout this specification
5 are not necessarily all referring to the same embodiment.
6 Furthermore, the particular features, structures, or
7 characteristics may be combined in any suitable manner in
8 one or more embodiments.

9

10 Other variations and modifications of the above-
11 described embodiments and methods are possible in light of
12 the foregoing disclosure. Further, at least some of the
13 components of an embodiment of the invention may be
14 implemented by using a programmed general purpose digital
15 computer, by using application specific integrated
16 circuits, programmable logic devices, or field programmable
17 gate arrays, or by using a network of interconnected
18 components and circuits. Connections may be wired,
19 wireless, by modem, and the like.

20

21 It will also be appreciated that one or more of the
22 elements depicted in the drawings/figures can also be
23 implemented in a more separated or integrated manner, or

1 even removed or rendered as inoperable in certain cases, as
2 is useful in accordance with a particular application.

3

4 It is also within the scope of an embodiment of the
5 present invention to implement a program or code that can
6 be stored in a machine-readable medium to permit a computer
7 to perform any of the methods described above.

8

9 Additionally, the signal arrows in the
10 drawings/Figures are considered as exemplary and are not
11 limiting, unless otherwise specifically noted.

12 Furthermore, the term "or" as used in this disclosure is
13 generally intended to mean "and/or" unless otherwise
14 indicated. Combinations of components or steps will also
15 be considered as being noted, where terminology is foreseen
16 as rendering the ability to separate or combine is unclear.

17

18 As used in the description herein and throughout the
19 claims that follow, "a", "an", and "the" includes plural
20 references unless the context clearly dictates otherwise.
21 Also, as used in the description herein and throughout the
22 claims that follow, the meaning of "in" includes "in" and
23 "on" unless the context clearly dictates otherwise.

24

1 It is also noted that the various functions,
2 variables, or other parameters shown in the drawings and
3 discussed in the text have been given particular names for
4 purposes of identification. However, the function names,
5 variable names, or other parameter names are only provided
6 as some possible examples to identify the functions,
7 variables, or other parameters. Other function names,
8 variable names, or parameter names may be used to identify
9 the functions, variables, or parameters shown in the
10 drawings and discussed in the text.

11

12 While the present invention has been described herein
13 with reference to particular embodiments thereof, a
14 latitude of modification, various changes and substitutions
15 are intended in the foregoing disclosures, and it will be
16 appreciated that in some instances some features of the
17 invention will be employed without a corresponding use of
18 other features without departing from the scope and spirit
19 of the invention as set forth. Therefore, many
20 modifications may be made to adapt a particular situation
21 or material to the essential scope and spirit of the
22 present invention. It is intended that the invention not
23 be limited to the particular embodiment disclosed as the
24 best mode contemplated for carrying out this invention, but

1 that the invention will include all embodiments and
2 equivalents falling within the scope of the appended
3 claims.